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(54) A dockship having a ride on/off  
system and craft units for heavy  
loads

(57) A dockship (1) having ride on/off  
facilities for loading and unloading  
heavy load modules has an open,  
unobstructed hold (2). The main  
structural strength members of the  
dockship (1) are double sidewalls, the  
upper surfaces of which form riding  
tracks (8) on which one or more gantry  
cranes can ride. The sidewalls (7) are

extended rearwardly to form  
extensions (18) which can be supported  
on the quay (14) by means of jacks (19).  
Extensions (20) of the riding tracks (8)  
are connected such that load carrying  
transporter units (11) can ride onto and  
off the ship. Each unit has double  
flanged wheels riding on a monorail  
and flat surfaced wheels riding on a  
parallel strip. The strip height varies,  
requiring height adjustment of the latter  
wheels. Pairs of units are connected by  
lateral beams for load carrying.

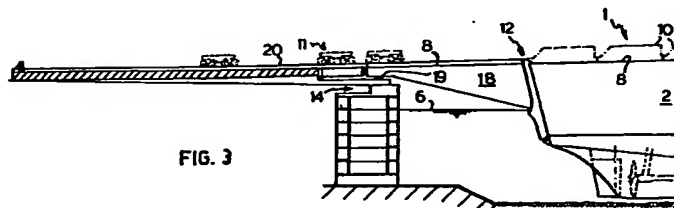
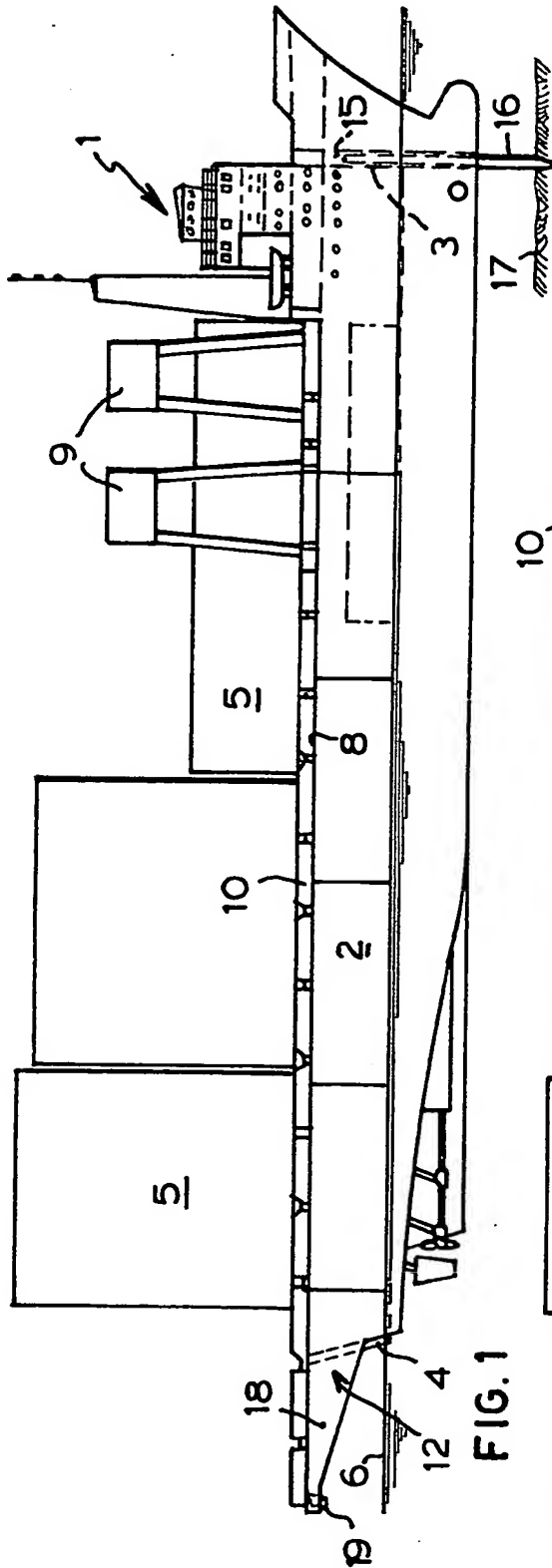


FIG. 3

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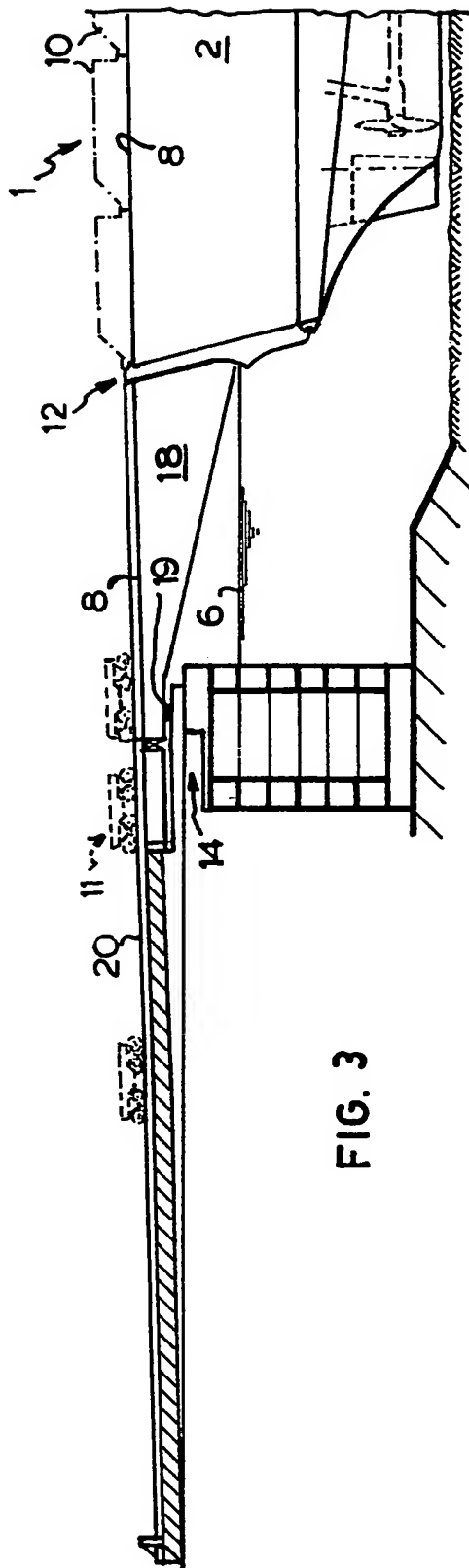


FIG. 3

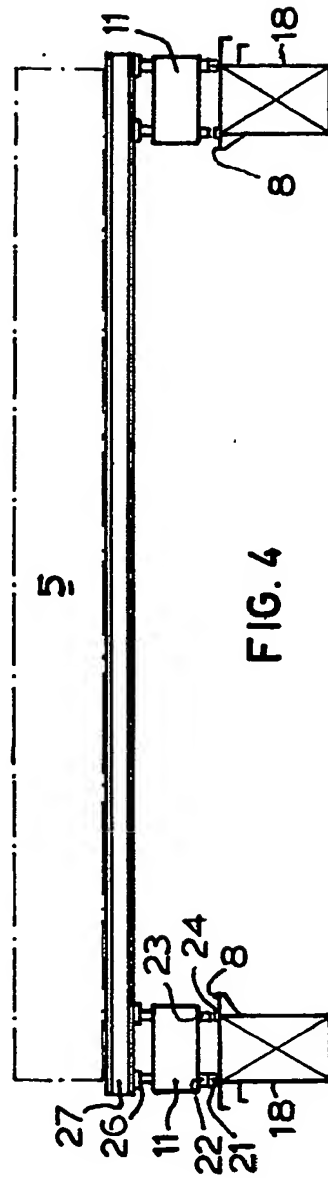


FIG. 4

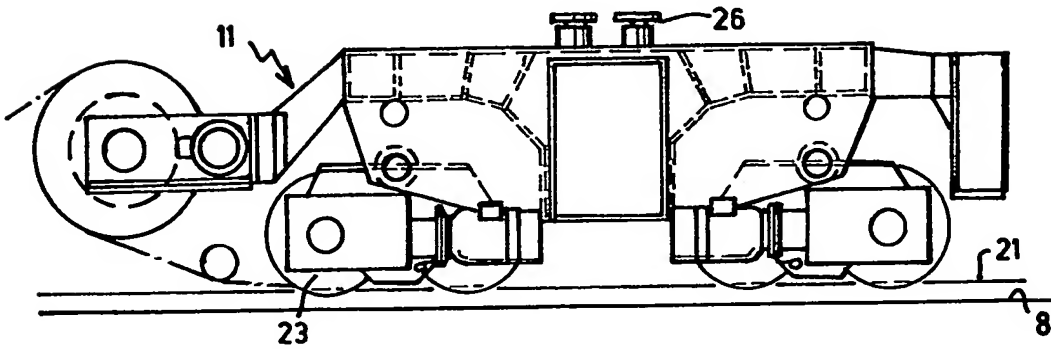
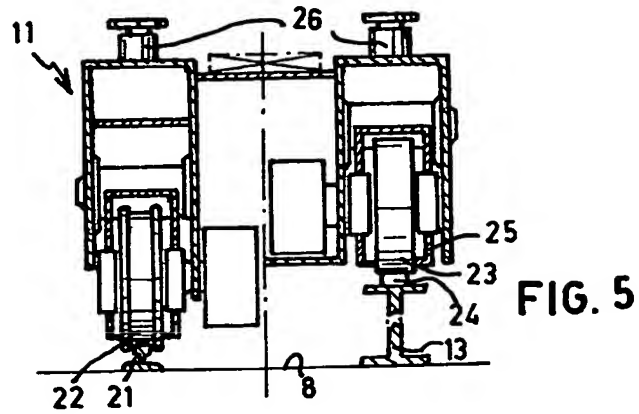


FIG. 6

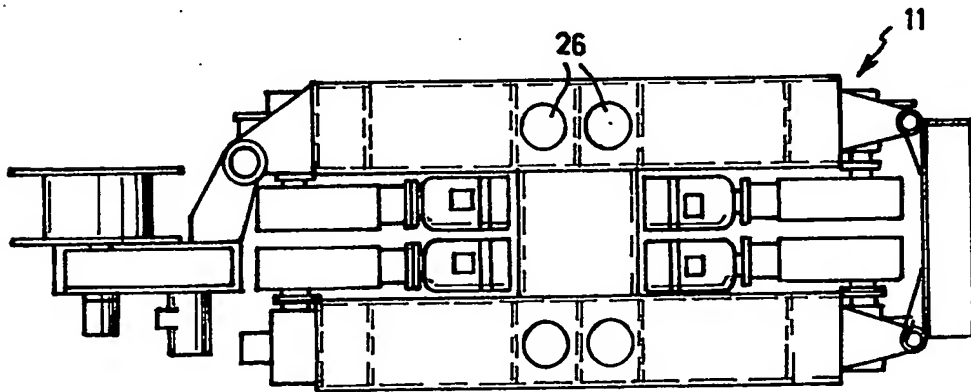


FIG. 7

## SPECIFICATION

### A dockship having a ride on/off system and craft units for heavy loads

5 The present invention relates to a dockship having a ride on/off system and craft units for heavy loads such as large prefabricated plant units. The craft units are arranged to be driven on structural strength members forming double boards on each side of a substantially open unobstructed hold onto side tail ends forming rearwardly directed outriggers on top in alignment with the double boards.

Such a dockship is described in British Patent Specification No. 2022521B in which known dockship between the rearwardly projecting extensions of the double sidewalls a ramp member is arranged which can be extended between the ship and the quay for road transport craft units which can transport a heavy load between the craft units on the two double boards to transfer the load between said respective craft units while jacking it up and down. The ramp member is hingedly supported with its two ends on the stern, and the quay, respectively, but this has the disadvantage that each time a transport craft unit passes the hinge supports of the ramp member under a heavy load which can weigh in the order of 500 to 1000 tons, considerable trimming moments are exerted on the ship at the location of the stern, resulting in many problems to keep the riding track well levelled under such heavy loads.

According to the present invention there is provided a dockship with a ride on/off system and craft units for heavy loads, the craft units being arranged to be driven on structural strength members forming double boards on each side of a substantially open hold onto side tail ends forming rearwardly directed outriggers on top in alignment with the double boards, characterised in that the side tail ends of the double boards are fitted out as support arms which come to rest on the quay.

As the side tail ends of the double boards are fitted out as support arms which come to rest on the quay, the load, when riding on and off, passes a rigid point at the stern. Thus, bending as the location of the riding track, which would occur with a ramp member being hingedly supported there, will not occur. The trim moment exerted by a load weighing about 600 tons with respect to the quay support of the ship against the moment exerted by a ship with a displacement of about 30,000 tons over the distance of its center of gravity up to the quay support, which distance is about 100 m, can therewith practically completely be neglected so that the riding track when riding on and off remains nearly perfectly levelled which considerably facilitates the loading and unloading of such heavy loads and makes such operations safer to perform.

Moreover due to the invention the transfer on board of heavy loads between respective craft units, for road transport and on board, as in the earlier dockship described in British Patent Specification No. 2022521B can be omitted which large operation can now take place on the quay before, and after,

respectively, riding the load on and off, under, of course, completely stationary conditions. The side tail ends come to rest on respective jacks as shore support points, with the craft units on both double board walls being adapted to each time ride on and off the side tail ends to and from shore extensions of the riding tracks located on the double board walls. This takes place on co-extensive rail tracks on the double board walls and their side tail ends and shore extensions, and as a further aspect of the new ride on/off system, in order to make running on rails of different level possible, each craft unit tracks on one side with double flanged wheels on a monorail on each of the double board walls and has on the other side unflanged wheels which are journaled in a vertically adjustable wheel housing so as to roll on a strip, particularly on a longitudinal coaming, which is arranged at a different height than the monorail.

Each craft unit comprises a number of jacks, and with a number of in particular four craft units, said craft units are interconnected two by two under the load by transverse supports resting on the respective jacks, with load balance on all the jacks and all the wheels, particularly also those wheels which roll on a strip with varying height.

An embodiment of the present invention will hereinafter be described, by way of example, with reference to the accompanying drawings, in which:—

95 Figure 1 is a schematic side view of a dockship loaded with heavy cargoes;

Figure 2 is a plan view of the dockship illustrated in Figure 1;

Figure 3 is a side view to a larger scale of the ride on/off system according to the present invention at the location of the stern of the ship;

Figure 4 is a cross-section, to an even larger scale of a pair of craft units on the opposite side tail ends of the ship; and

105 Figures 5, 6 and 7 show in more detail a craft unit in longitudinal section, horizontal section, and cross-section, respectively.

The dockship illustrated in the drawings has an open unobstructed hold 2 which extends from the forepeak bulkhead 3 to a stern gate 4.

The ship's draught with the stern gate 4 closed and with dry cargo 5 transported in the hold 2, is indicated at 6.

Double boards 7 are the main structural strength members of the longitudinal structure of the ship and are formed as buoyancy chests. The upper surfaces of the double boards 7 form riding tracks 8 on which one or more gantry cranes 9 can ride. The cranes 9 can be used for the loading and unloading of heavy loads 5 into the hold 2. The loads 5 can be up to 1000 tons, and may be, for example, large boiler installations and reactor vessels and the like.

The hatch opening of the hold 2 can be closed by means of strong box-shaped watertight hatch covers 10. It is possible to secure the hatch covers outside along the boards 7, such that they act as buoyancy chests to increase the stability, particularly when heavy deck loads are to be transported. The heavy deck loads consist of larger modulus 5 which cannot be handled and stowed in the hold 2 by the gantry

crane 9. Such large objects are driven fore and aft on the riding tracks 8 on craft units 11, and loading and unloading thereof takes place by rolling the units 11 on or off over the stern 12. With the ride on/off system as illustrated in the drawings modules 5 with a piece weight of up to even 2000 tons can be loaded and unloaded. Stowage on deck takes place on the hatch covers 10, which for that purpose extend in a continuous array over the hold 2. The hatch covers 10 are supported on the inner walls of the double board walls 7 on longitudinal coamings at that location, and are constructed to be sufficiently strong such that they take over the heavy modules 5 from the craft units 11.

Stowage on deck of the modules 5 can thus take place in a secure manner using a roll on/off system. When loads are to be rolled on/off, the dockship 1 lies with its stern 12 to the quay 14 and is fixed by means of an anchor spud installation which is illustrated schematically in Figure 1. The anchor spud installation comprises a spud 16 arranged in a fall tube 15 which passes through the foreship, the spud is simply dropped with its point into the ground 17, and thus provides an anchor.

As illustrated, the double board walls 7 of the dockship 1 extend rearwardly to form side tail ends 18 which are supported by means of respective jacks 19 on the quay 14 to rigidly sustain the ship 1 there. Thereafter, wall extensions 20 of the riding tracks 8 are connected.

As can be seen in Figures 4 and 5, a monorail 21 is provided on each riding track 8. Double flanged wheels 22 on one side of the craft units 11 run on the monorail 21. On their opposite side each craft unit 11 has unflanged wheels 23 which roll on strip 24 which is arranged at a higher level than the monorail 21. The strip 24, as indicated, is secured on top of the longitudinal coaming 13. However, in the shore extensions 20 of the riding tracks 8, the strip 24 is at the same level as the monorail 21 and thus the strip 24 is at a varying height relative to the monorail 21. Because of this, the wheels 23 are journaled in telescopically vertically adjustable wheel housings 25. As can be seen in Figure 5, the double flanged wheels 22 are also vertically adjustable, such that each craft unit 11 may be moved along rails of equal level in two height positions.

Each craft unit 11 has on each side, forwardly and rearwardly, wheel pairs 22, and 23, respectively, tracking one behind the other, and carries on each side a pair of jacks 26, sustaining under pressure balance each time a transverse support 27 extended between two craft units 11, one on each side of the ship 1, as viewed in Figure 4. On said transverse supports 27 the load 5 is sustained in accordance with the stowage plan to be plotted, with care being taken for load balance on the various jacks 26 and also on all the wheels 22, and particularly also on the height-adjustable wheels 23.

Finally it is remarked that the illustrated embodiment of the ride on/off system is of course subject to modifications, within the scope of the invention.

#### CLAIMS

1. A dockship with a ride on/off system and craft units for heavy loads, the craft units being arranged

to be driven on structural strength members forming double boards on each side of a substantially open hold onto side tail ends forming rearwardly directed outriggers on top in alignment with the double boards, characterised in that the side tail ends of the double boards are fitted out as support arms which come to rest on the quay.

2. A system according to Claim 1, characterised in that the side tail ends come to rest on respective jacks as shore support points.

3. A system according to Claim 1 or 2, characterised in that the craft units on both double board walls are arranged to ride on and off the side tail ends to and from shore extensions of the riding tracks located on the double board walls.

4. A system according to Claim 3, characterised by co-extensive rail tracks on the double board walls and their side tail ends and shore extensions.

5. A system according to any of the preceding claims, characterised in that each craft unit tracks on one side with double flanged wheels on a monorail on each of the double board walls and has on the other side unflanged wheels which are journaled in a vertically adjustable wheel housing so as to roll on to a strip, for example, on a longitudinal coaming, which is arranged at a different height to the monorail.

6. A system according to any of the preceding claims, characterised in that each craft unit comprises a number of jacks, and with a number of in particular four craft units, said craft units are interconnected two by two under the load by transverse supports resting on the respective jacks, with load balance on all the jacks and all the wheels, particularly also those wheels which roll on a strip with varying height.

7. A dockship comprising a spud in a fall tube through the foreship as anchoring equipment ahead for mooring the ship with its side tail ends abaft resting on the quay.

8. A ride on/off system for a dockship substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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